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Wildlife Conservation

THROUGH EROSION CONTROL IN THE PIEDMONT

FARMERS'
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EROSION has left scars on a majority of farms in the Southeast. Too poor to produce crops, the eroding spots are usually abandoned. Unless they are treated to stop further washing of the soil they grow steadily larger and continually rob the farmer of more of his land. Fortunately, soil conservation and wildlife management can be effectively combined, and otherwise worthless areas made to produce a crop of game, fur bearers, and other desirable types of wildlife.

The general principles of wildlife management on the farm are described in Farmers' Bulletins 1719 and 1759. The purpose of this bulletin is to show how gullies, terrace outlets, waterways, eroding field borders, pastures, and woodlands in the Piedmont region may be protected against erosion through the use of vegetation that will also provide food and cover for wildlife.

WILDLIFE CONSERVATION THROUGH EROSION CONTROL IN THE PIEDMONT

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INTRODUCTION

AN ABUNDANCE of songbirds, game, fur-bearing animals, and other types of wildlife makes farms more valuable and farm life more enjoyable. They help to protect crops against pests and add to the beauty of the farm itself; they provide sport and recreation for the farmer, his family and friends, add delicious variety to the farm fare, and in some instances may have a very real market value. Any possible damage to farm crops by increased numbers of wildlife is ordinarily amply compensated by their value as a crop or by their destruction of insects.

Every eroding galled spot, odd corner, field border, terrace outlet, and gully is a potential haven for wildlife. By healing these scars with soil-conserving grasses, legumes, and shrubs, farmers may convert them from costly wasteland into productive wildlife habitats. Thus a wildlife crop is obtained with only a negligible reduction of tilled fields, and erosion is checked on unused acres.

The relation between soil conservation and wildlife management is so close that by proper planning, the benefits of both may be achieved in the same operation.

Before the Southeast was settled, nature controlled erosion on the hillsides with vegetation. Man has found no better method of preventing soil wastage. Though he builds terraces and uses other mechanical or artificial structures to minimize soil losses on cultivated fields, a complete job is done only with the use of plant cover.

All kinds of plants help to control erosion. Some are more desirable than others. Close-growing crops like the lespedezas are best. It so happens that the bobwhite quail feeds on the seeds of lespedeza and finds cover in its thick growth. Many other plants considered excellent for erosion control are equally beneficial as bird food and cover.

Wildlife conservation, for these reasons, can be accomplished by the proper selection of erosion-control vegetation and by simple farm planning that places food and cover where it will do the most good.

Farmers now appreciate the fact that increase of game depends upon improvement of the environment. Such improvement requires that patches of food and cover be well distributed over the entire farm and that a sufficient variety of plants be provided to supply wildlife needs the year round. These principles are followed on Piedmont farms cooperating with the Soil Conservation Service. They can be extended by individual farmers to their own lands, whether their holdings be large or small. This bulletin describes the practices that have proved successful in both soil and wildlife conservation. The application of these practices may be illustrated in detail by taking a specific farm as an example. A map of this farm (fig. 1, p. 3) shows the location of fields and woodlands, and the distribution of gullied areas, terrace outlets, field borders, and other eroded areas that have been treated to make them suitable wildlife habitats. Increased numbers of quails, rabbits, and other wildlife prove the success of the practices employed.

Information is also given on the selection and planting of shrubs and other fruit- and seed-bearing plants that are effective in erosion control and especially beneficial to wildlife.

KEY TO PLANTINGS AND WILDLIFE INCREASE ON SAMPLE FARM (FIG. 1)

G, All gullies and old roadways sown to various lespedeza mixtures. Shrub check dams of coralberry, blackberry, privet, and plum placed in gully channels. These plantings control erosion, prevent rapid run-off, and provide food for wildlife.

T, Shrub check dams of food-producing species planted to retard flowing water at terrace outlets. These plantings supplement the wildlife food supply.

Z, Eroding field borders sown to lespedezas in mixture with various other plants to prevent erosion and provide food for birds.

P, Special food-patch mixtures containing lespedezas sown on eroding areas for protection of soil and wildlife benefit.

F, Woodland north of field 3 newly planted to trees mixed with plants that provide food for wildlife. These plantings protect the steeper slopes, benefit wildlife, and produce a timber crop.

Quail coveys showed an increase of 28 permanent residents and 30 additional temporary residents the first year after plantings were made. Three new coveys came to stay, two other coveys came to the farm while snow was on the ground. There was an increase of five birds in the original coveys. Each covey used the various plantings nearest its headquarters.

Another covey could live on the west side of field 7, and one could use field 8 if a hedgerow were along the boundary.

No burning is practiced on this farm, and all plantings and woodlands (except the one forest pasture) are protected from livestock.

CONSERVATION ON CULTIVATED FIELDS

Wildlife benefits from erosion-control activities of two types: Soil-conserving farming practices on cultivated fields and the setting aside and development of eroded areas especially for wildlife use. Practically every farm offers an opportunity to use both of these types of conservation practices; both are a part of the conservation program on the sample farm mapped in figure 1.

Terracing and strip cropping cultivated land (fig. 2) help to distribute food and cover and to make a larger portion of the farm more suitable for wildlife, as the treatment of field 11 of the sample farm

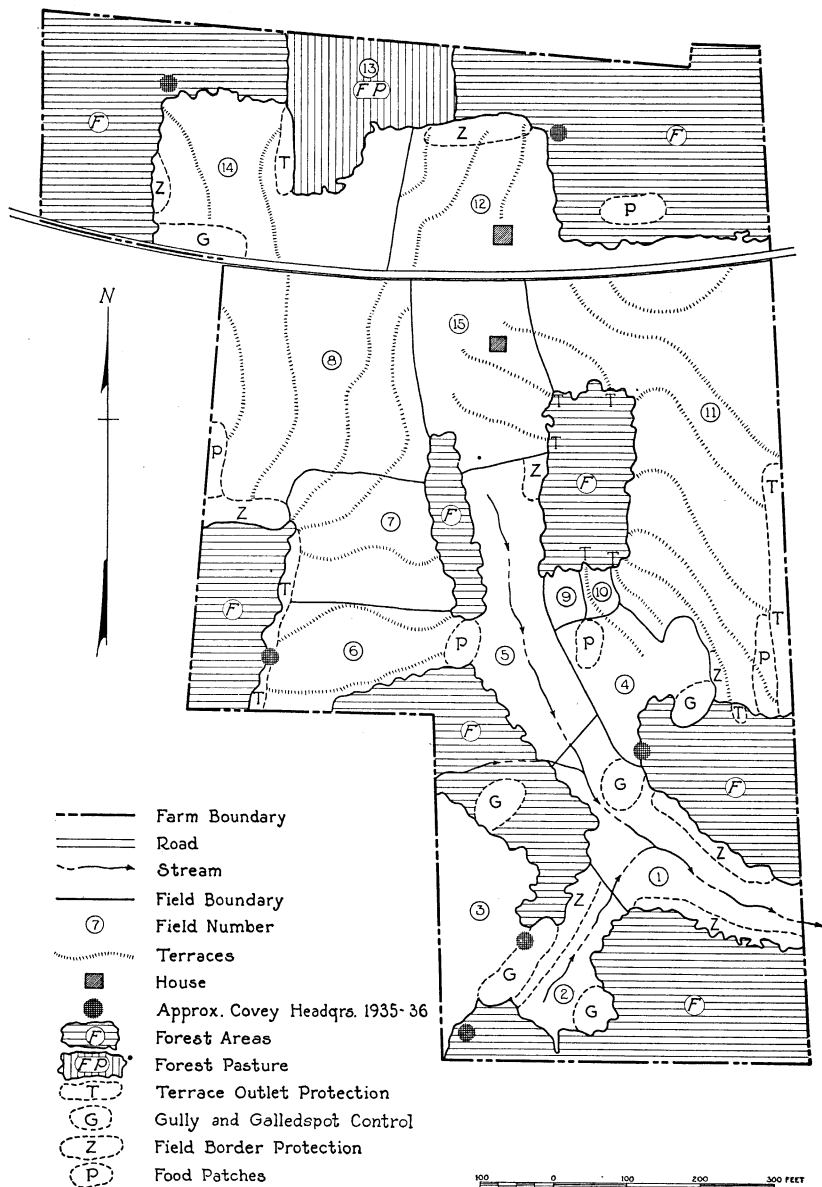


FIGURE 1.—Map of a sample 160-acre Piedmont farm showing the use of erosion-control measures to benefit wildlife.

shows. This 25-acre plot has been terraced and is now strip-cropped with a 3-year rotation. One-third of the field is plowed and cultivated in a row crop each year, another third grows small grain, and



FIGURE 2.—Strip cropping assures a desirable intermixture of wildlife food and cover types.

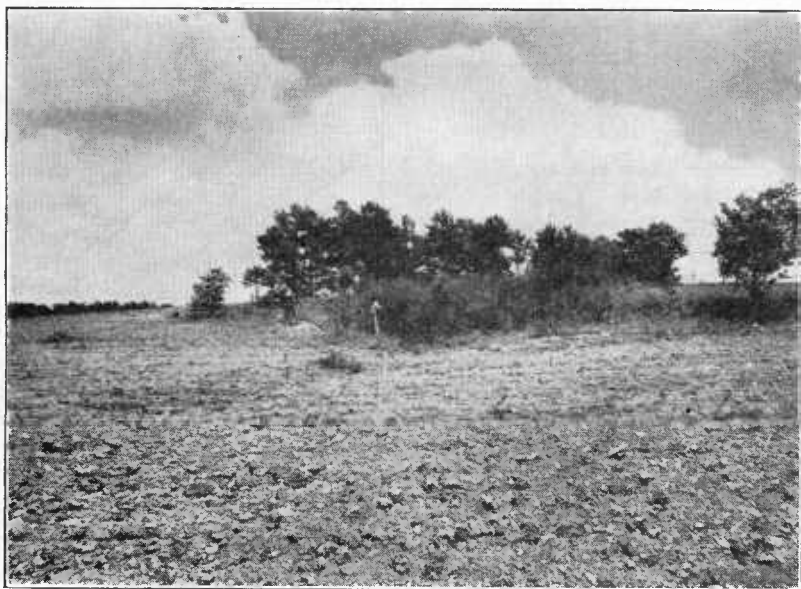


FIGURE 3.—An island of cover in a cultivated field is a haven for wildlife and makes more of the cropland accessible as feeding ground.

the remainder hay. Consequently about two-thirds of this field now provides range every year for a variety of birds and other animals. Before these soil-conserving practices were begun the entire field was plowed and planted to a single crop. Its value to wildlife was thus periodically destroyed.

The practice of leaving odd corners and strips of unharvested lespedeza or other legumes, shocks of corn, or standing corn adjacent to field borders and woodland increases the value of cultivated fields for wildlife. An area of a few square yards of such unharvested crops will be sufficient to make a material contribution to the food supplies of birds and other animals. The covey of quail near field 12 of the sample farm, for example, gets an important part of its food during the fall and winter from small patches of lespedeza left along the borders of the field.

However, it should be remembered that quail and many other species do not concentrate to any great extent; hence accommodations for them must be well distributed. One or possibly two coveys of quail may use one small area, but a covey cannot be expected to travel more than an eighth of a mile or to pass through exposed areas to reach its daily food. Were this necessary, survival and increase would not be satisfactory. Moreover, the food left for quail is shared by many other birds, as well as by mice, rats, and other small animals. Mold and decay take their toll. If the game species were forced to secure all their food from one or a few small areas their natural enemies might watch such places and more readily harm them. It is, therefore, important to have a number of food patches well scattered over the farm and located close to good protective cover where the birds can feed in security. Strip cropping, crop rotation, the leaving of strips and small corners of uncut food-producing crops such as lespedeza, cowpeas, other legumes, and corn, and the general diversification of agriculture through soil-conservation practices help to bring this about. Leaving or establishing patches of cover in the midst of cultivated fields also contributes to the desirable interspersing of food and cover (fig. 3). Note how diversification is accomplished on the sample farm in figure 1.

If maximum wildlife production is to be obtained from farms, fire must be checked. The burning of crop refuse and of plant growth in fence rows and woodlands along field margins destroys conditions most favorable to wildlife.

DEDICATING ERODED AREAS TO WILDLIFE

Practicing soil-conserving methods on cultivated fields alone will not produce enough food and cover for wildlife. If the game crop is to be permanent, food and cover for all the year and for every year must be provided. This can be done only by devoting a portion of the land exclusively to wildlife.

The amount of land needed for this purpose varies with local conditions. On the basis of present knowledge, it appears that often as little as 3 percent of the total land area, if properly distributed over a farm, is sufficient for sound wildlife management in agricultural sections of the Southeast. Throughout many of the severely eroded sections of the Piedmont, gullies and other barren areas,

slopes too steep to cultivate, severely eroded field borders, odd corners, and similar plots of little or no value for crop production already make up such a proportion of the land. While this amount may not support a maximum game crop, it generally will make a satisfactory addition to the farm wildlife resources.

GULLY AND GALL-SPOT CONTROL

Much of the area available for wildlife use on farms in the Piedmont is composed of gullies and galled spots. These vary from a few square yards to several acres in extent and frequently consist of abandoned and neglected fields or parts of fields. Simple methods for improving such tracts are available. Often the run-off water from surrounding land is diverted from these eroded areas by terracing adjacent fields or constructing diversion ditches; and seeding, shrub planting, and mulching satisfactorily control erosion.

Where the ground is not too rough, a disk harrow or common drag can be used to break the soil slightly. In the rougher spots (fig. 4) common garden rakes may be used. A suitable seed mixture, preferably one that includes lespedeza (p. 23), and a complete fertilizer broadcast over the area, followed by a generous coating of mulch, will produce a close vegetative cover that will stop washing (fig. 5). In gully channels shrub check dams placed at intervals cut down the velocity of run-off water sufficiently to allow the seeded plants to establish themselves (fig. 6).

This treatment has been used successfully on the area extending from the low bottom land of field 2 up to field 3 of the sample farm (fig. 1). In this instance it was impractical to divert the run-off water from above because there was no suitable place to which it could be carried and discharged. Shrub check dams of coralberry, common blackberry, bicolor lespedeza, common hedge privet, wild plum, and Himalayan blackberry were placed at intervals in the gully channels. In the immediate vicinity of these gullies are such shrubs and vines as wild cherry, elderberry, dewberry, wild grape, persimmon, cat brier, and Virginia creeper. The gully plantings supplement the surrounding natural growth, and wildlife is thus assured a continuous food supply—for winter, when other foods are scarce; and for summer, when fruits are essential to a varied diet.

The plantings practically stopped erosion in these gullies the first season. They also attracted wildlife. A covey of nine quail established headquarters in the north end of the gullies in the fall and remained through the winter without loss. A second covey of 15 birds from the adjoining farm sought this gully and that on the east side of field 2 during the heavy snows of that winter. Many cottontail rabbits also found shelter and food here.

OLD ROADWAYS

Throughout the Piedmont are many old roadways, abandoned because of excessive erosion (fig. 7). The treatment recommended for other gullies might be extended to these, with great benefit to wildlife (fig. 8). An instance of a severely eroded roadway protected by soil-conserving vegetation is the gully along the southern border of field 14 of the sample farm.



FIGURE 4.—Gullied area ready to be seeded to grasses and legumes.



FIGURE 5. —The area shown in figure 4 seeded to Sudan grass, the perennial *Lespedeza sericca*, and the annual Korean lespedeza. It has become a haven for wildlife. Coveys of quail and other forms of wildlife often use such areas the first season after they are planted.

SEEDING OF GULLIED AREAS

Because of the poor quality of soil in gullies and galled spots the kinds of plants that will thrive in them are limited (fig. 9). Throughout most of the Southeast, one or more of the lespedezas have been planted with success. Extensive use has been made of Korean lespedeza alone. This variety will reseed for at least 3 years. Both *Lespedeza sericea* alone and a mixture of Sudan grass with this lespedeza have been successful. The mixture seems to be the more promising. Sudan grass produces both cover and food, controls erosion, and acts as a nurse crop during the first season while the lespedeza is establishing itself. During the second year this perennial lespedeza puts forth a vigorous growth. Since it

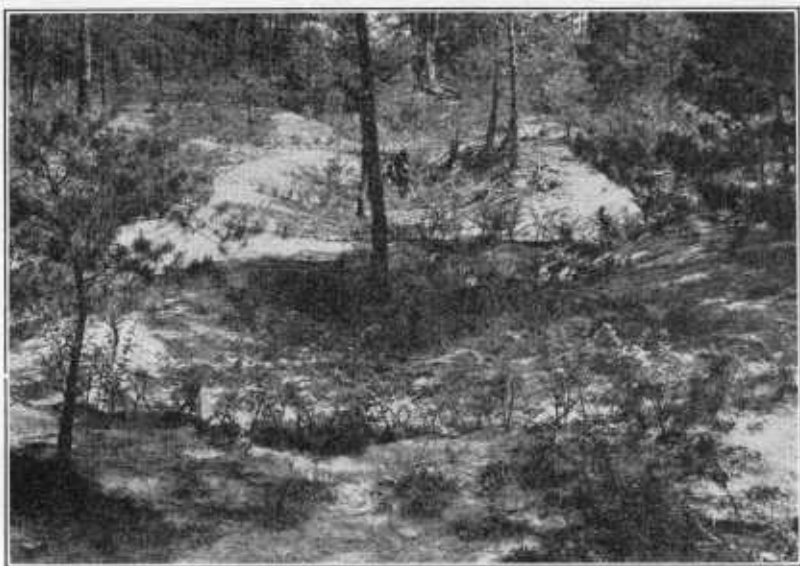


FIGURE 6.—Shrub check dams of coralberry have been placed at intervals in this gully, which is to be planted to *Lespedeza sericea*.

grows higher than the lower annual varieties it is preferable for wildlife, especially in sections where deep snows are common. In addition to protecting the soil it provides excellent food and cover. To get successful germination of *L. sericea* the first year, the seed should be lightly scarified.

A mixture of one or two lespedezas and orchard grass also has been used extensively. This combination is desirable for both quail and rabbits. The orchard grass gives better soil protection during the winter months, perhaps, than the lespedezas alone and provides green food during the winter.

Several methods of seeding have been employed. In some sections, especially on rough areas, broadcasting and mulching the seed immediately after a good spring rain have given excellent results. Varying amounts of fertilizer have been used with success. Sometimes no fertilizer is needed. An application of stable manure serves both as fertilizer and mulch.



FIGURE 7.—An old roadway destroyed by erosion.



FIGURE 8.—A dense stand of Sudan grass and *Lespedeza sericea* on this abandoned roadway checked erosion completely after one season of growth. The Sudan grass holds the soil and acts as a nurse crop for the lespedeza.



FIGURE 9.—*Lespedeza sericea* is one of the few plants that grow successfully in gullies and galled areas. These plants grew from seed that washed into the gully from a hayfield several rods above.

MULCHING

Mulching holds the soil, prevents the seed from washing off, and helps to conserve moisture. It also furnishes shade, which helps the young plants to establish themselves on barren areas (fig. 10). The seeding of gullies and other raw areas without mulching is not recommended.

Pine-bough mulch seems to give the best results (fig. 11). This material frequently can be secured from cutting or thinning operations in farm woodlands. Grain straw and woods litter are also satisfactory. Care should be taken in applying the mulch to make sure that the covering shall not be so thick and matted as to retard plant growth.

After stands of *Lespedeza sericea* have been established the more even portions of the eroded areas may be scythed or mowed each fall and the harvested growth used for mulching other gullies and barren spots. By this method seeding and mulching are accomplished in one operation.

SHRUB CHECK DAMS

In gullies carrying any great amount of water it is difficult to establish satisfactory vegetative control without installations to prevent the water from washing out the young plant growth and continuing to deepen the gully. Shrub check dams serve this purpose and also collect silt, which gives other vegetation a better



FIGURE 10.—Vegetation is difficult to establish on barren, eroded areas without the use of some kind of mulch.



FIGURE 11.—Pine boughs make an effective mulch that aids in the establishment of vegetation on galled spots and in gullies.

chance to grow and thus gradually fill up the channel. Shrub check dams should be placed at right angles to the flow of water and should extend up the sides of the channel far enough to prevent water from skirting the ends of the rows (fig. 12). To establish the plant check dams, trenches about 8 inches wide and 8 inches deep are dug at selected places. Plants are set 3 to 6 inches apart in the

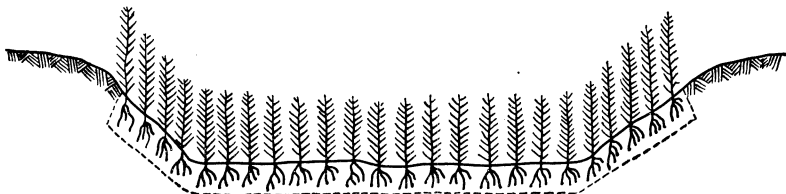


FIGURE 12.—Shrubs used in a check dam should extend well up the sides of the gully in order to keep the water from cutting around the ends of the row.

trenches, according to the probable strength of the current; the closer the plants are set, the greater the resistance offered to flowing water. The soil must be packed firmly around them to prevent their being washed out.

Usually plants set in gullies need protection until they become firmly established. This may be provided by small sod or brush dams 8 to 12 inches high (fig. 13) or by rows of stakes driven into the ground 8 to 10 inches apart. Such structures should be placed about 12 inches down the channel so the silt will settle around the plants.

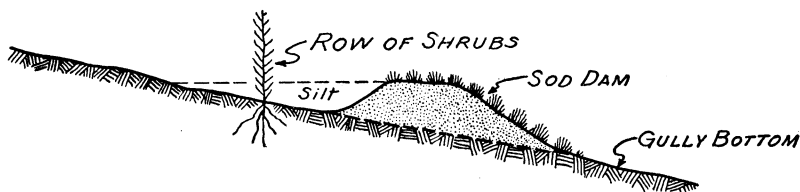


FIGURE 13.—Cross section of a temporary dam used to protect shrubs until they become established.

The silt will hold moisture and provide a better plant bed. If proper species are used, they will grow fast enough to keep pace with the silting as the gully fills.

From the standpoint of wildlife management it is desirable to use shrubs that will supplement existing food and cover. Poor growing conditions in gullies, however, limit the number of species that will thrive. Those most suitable for erosion control, of course, must be considered first. Some of the best for this purpose are listed in group 1 of the plants recommended for erosion control and wildlife conservation (p. 21).

TERRACE OUTLETS AND WATERWAYS

Another type of waste area that can be made productive of wildlife on many farms is the terrace outlet (fig. 14). Unless protected, terrace outlets may cause much soil loss. Gullies may start in them and invade fertile fields. Frequently the discharge of large volumes of water from terraces into narrow strips of woodland starts

gullies where the water reaches cultivated land beyond the wooded strips, or even in the woodlands themselves.

As in gully control, it frequently is possible to control the water discharged from terraces by establishing rows of shrubs at right angles to the flow. In terrace outlets, however, it is not desirable to

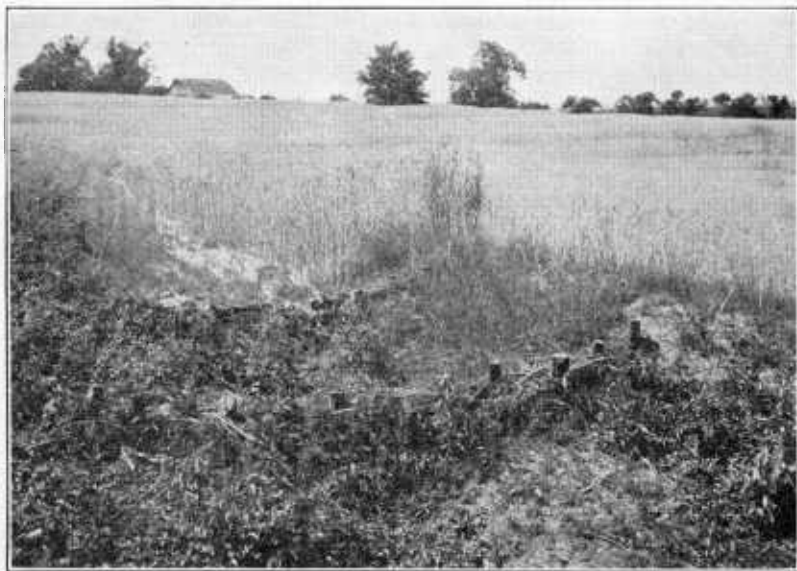


FIGURE 14.—Two short rows of shrubs have been planted to protect this terrace outlet. When they are well established they will add to the food and cover for wildlife on the farm.

place shrubs where they will block the terrace channel or interfere with the discharge of the water. This would cause silting in the channel and, eventually, breaking of the terrace. Plantings should, therefore, be placed far enough beyond the end of the terrace to

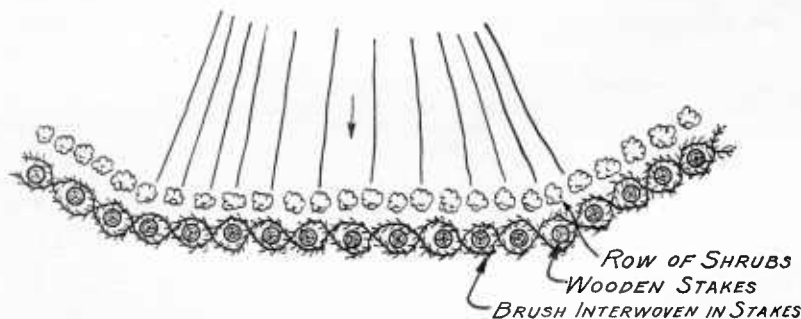


FIGURE 15.—A row of stakes gives protection to shrubs planted below an outlet until they have become established.

permit free flow of water out of the channel, but not far enough down the slope to permit uncontrolled water to start new gullies. When terraces empty individually upon uncontrolled areas, rows of shrubs should be planted beyond the end of each terrace straight

across the entire width of the outlet, with wings extending to higher ground to prevent water from running around the ends. When shrubs are placed in a half circle about the outlet, water may concentrate and deposit silt at one point, and eventually develop a fall, with consequent washing. Straight rows of shrubs tend to spread the water and avoid this danger.

To protect the terrace and the shrubs until the latter are firmly established, rows of stakes or layers of brush can be placed a few inches below each row of plants (fig. 15).

Terrace outlets on the sample farm (fig. 1) have been planted with erosion-resisting shrubs. It was possible to secure many of them on the farm itself. By planting these shrubs on the terrace outlets each species was distributed more widely over the farm, with the result that it can be better utilized as food and cover for wild-



FIGURE 16.—Vegetated waterways carry water from terrace outlets. Vegetation beneficial to wildlife is suitable for protecting these waterways.

life. From a single plum thicket, for example, one that may have been used previously by only one or two coveys of quail and a few other animals, plants were taken to establish enough plum thickets to benefit several coveys of quail and other wildlife. Care was taken, of course, to see that the wildlife value of the original plum thicket was not impaired.

Terrace outlets frequently extend several yards into woodlands or idle fields, and terraces may cut off corners too small to be cultivated. These areas may be made useful to wildlife by establishing on them cover or food patches.

If water from terraces is emptied into natural draws or artificially constructed broad-bottom waterways, wherever possible plants that furnish food and cover for wildlife should be used to protect the waterways (fig. 16). If vegetated waterways are cut for hay, uncut

strips may be left on the banks and near the lower ends for the use of wildlife.

FIELD BORDERS

Because of shade, root competition, and severe sheet erosion, many field borders remain barren throughout the year. There are few better places to plant erosion-resisting vegetation for utilization by wildlife. Simple measures will restore a protective cover that will check erosion and attract wildlife (fig. 17).

After the border strip has been disked lightly and a fertilizer applied, lespedeza or one of the mixtures suggested for gully seeding may be broadcast. While the lespedeza may not grow high enough for hay, it is likely to produce a large seed crop and reseed the following season. This may continue for a number of years, but re-



FIGURE 17.—In many sections of the Southeast *Lepedeza sericea* is used successfully to protect eroding field borders and highway banks.

ardless of whether the lespedeza reseeds, enough humus and cover soon will have accumulated to stimulate a satisfactory volunteer growth. Several kinds of desirable plants, such as wild lespedezas, beggarticks, partridge-peas, and trailing beans, establish themselves in field borders so planted. On the sample farm the border strip along the north side of field 1, planted to Korean lespedeza in this manner, was used the following winter by a covey of six quail with headquarters at the south end of field 4.

Common and Korean lespedeza, *Lepedeza sericea*, and Sudan grass have been used in the treatment of field borders in the Piedmont. When *L. sericea* is used either in mixture or alone, it may seem to have failed because only small plants are visible at the end of the first season. The strip should not be disturbed, however, for the second and third seasons usually produce a luxuriant growth. In some sec-

tions soybeans, cowpeas, and browntop millet, in mixtures with lespedeza, have been used with success for seeding field borders.

Where practically all of the topsoil has been removed the best way to assure satisfactory plant growth is to apply a mulch, as was suggested in connection with gully control. Small gullies along field borders can be checked with a few rows of shrubs.

Once vegetation has been established on these sites the soil begins to build up. Eventually more vigorous types of vegetation prevail. Then root competition and shade may cause the strip to encroach on the field. To prevent this and to keep the strips useful for wildlife, as originally intended, it is necessary to keep the vegetation under control. This can be done by disking the entire border strip every second year, or half the width of the strip every other year if the strip is more than a rod wide. This assures food and satisfactory nesting sites each year. If saplings become numerous they should be removed.

Vegetation established on areas planted for wildlife should be given adequate care during later years. Where the land is not too rough, a system of disking alternate contour strips every 2 or 3 years ordinarily is sufficient to regulate the vegetation. In rough gullied land or even where light disking might accelerate erosion, it may be necessary to keep larger shrubs and trees thinned out so that sufficient sunlight will reach the ground to stimulate annual and perennial legumes, shrubs, and other low-growing plants. Such thinnings should leave as many different kinds of trees and shrubs as possible, especially of the species herein listed as valuable to wildlife. The open stands permit the growth of sufficient ground vegetation to control erosion and provide suitable range for many forms of animals.

RETIRED LANDS

Portions of numerous farms in the Southeast have been retired from cultivation or are temporarily idle. These areas vary from fairly steep slopes with practically no topsoil to fertile bottom lands; from plots of one-fourth acre to entire fields of as much as 40 acres. Such retired areas may advantageously be planted for the conservation of soil and wildlife.

The retirement of the small, steep, sheet-eroded unit at the end of field 6 of the sample farm, for example, not only helped to prevent continued sloughing-off of the remainder of the field, but also made possible a better terracing and crop-rotation system on the field. A dense stand of Korean lespedeza was established on this plot and this, together with shrub checks already present in small gullies, almost completely stopped soil erosion the first season.

When larger idle fields are developed for wildlife it is not always necessary to plant the entire tract to seed-producing plants. Parts of such fields may be used for cover plantings and the remainder for nesting cover and general range. Generally a strip 50 feet wide along the field border provides an abundance of seed (fig. 18). On a field of 5 acres or more, several narrow strips may be planted on the contours.

On retired lands planted especially for wildlife it is desirable to have a variety of seed-producing plants, as wild animals do not thrive

and reproduce most successfully on a diet of only one or a few kinds of food. When replanting each spring is impractical, perennial or reseeding species should be included in each mixture (fig. 19). Areas thus treated will remain in satisfactory condition for wildlife 3 to 6 years or more. Seeding of the plots should be rotated so that some will be newly sown each year.

Light disking in the fall and winter at intervals of 2 or 3 years generally stimulates desirable volunteer growth. On rolling land, narrow strips should be disked on the contour. It is not known how frequently it may be necessary to disk areas on which *Lespedeza sericea* has been established, although in some places this crop has been known to hold its own 4 to 8 years.

If fields retired from cultivation are to be planted to trees, such plantings can be made to provide food for wildlife by including



FIGURE 18.—*Lespedeza sericea* sown with soybeans and millets provides ample soil protection and an abundance of wildlife food and cover.

nut-, fruit-, and seed-producing species of particular value for this purpose. If large woodland plantations are established, strips 20 to 50 feet wide, located at regular intervals on the contour, should be planted with food- and cover-producing shrubs and herbs. On the sample farm the woodland north of field 3 is a newly planted forest which has been established to control erosion, produce a timber crop, and conserve wildlife. A narrow strip inside the fence surrounding a woodland may readily be planted with food-producing shrubs, annuals, and perennials beneficial to wildlife.

It is sometimes necessary to fence woodlands to prevent damage to the wildlife-feed plantings by grazing animals. Intensive grazing or uncontrolled burning destroys the value of woodlands as wildlife cover and exposes the soil to rapid erosion (fig. 20). Livestock should be excluded from tree plantations and from woodlands

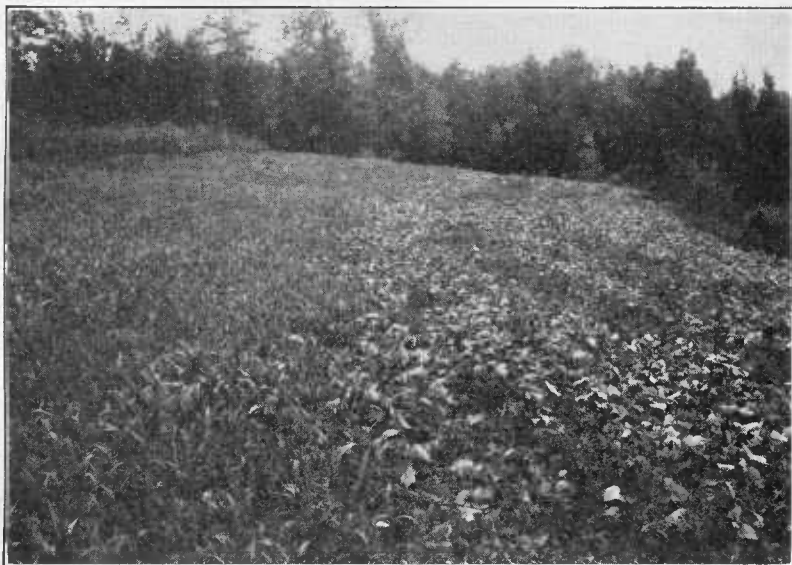


FIGURE 19.—If permanent cover is desired, perennial or reseeding species should be included in the seed mixture. The soybeans and millets give both soil protection and cover for wildlife during the first season. The lespedezas take over the area in following years.



FIGURE 20.—Severe grazing of woodlands destroys ground cover and shrubs needed by wildlife. Note the difference in the grazed (right) and ungrazed (left) portions of this woodland.

intended for timber production, and fire should be controlled on the entire farm. These precautions will permit the natural development of wildlife cover in protected situations.

PASTURES

Quail and other birds often resort to pastures, especially during cold, wet weather. If common lespedeza is included in the pasture mixtures, not only will good forage be produced, but seed will mature and remain available to birds throughout the winter, even where fairly close grazing is allowed.

The planting of gullies and galled spots in pastures, if carried out as described on page 6, will improve conditions for wildlife if the vegetation is properly protected. Areas planted to lespedeza or any other vegetation the establishment of which will be prevented by grazing should be fenced to exclude livestock.

Shrubs such as coralberry, wild plum, common hedge privet, and wild rose are especially valuable for gully control in pastures as, when once established, they will not be damaged materially unless they are severely grazed.

The common honeysuckle may provide good cover on small areas. The establishment of this plant alone, however, cannot be depended upon to increase the wildlife supply, and where it is already abundant or where it might become a pest, plantings are not recommended. It may be used to provide cover along fences and on small gullied areas in pastures and grazed fields where cover of more valuable species will not persist.

THE WILDLIFE CROP ON THE FARM

Wildlife increases on the sample farm, on which the various methods of erosion control discussed in this bulletin were actually used, indicate the kind of returns that farmers may expect if in stopping soil losses they also convert eroded acres into wildlife habitats. While this farm happened to have all the situations favorable for development and is hence a good illustration, it is ordinarily rare to find an ideal area. But some of the treatments can be made on any farm.

The treatment of gullies, terrace outlets, and field borders and the provision of food patches on this farm made it possible for it to support six coveys of quail the first year after plantings had been made. The headquarters of these coveys are marked on the farm map (fig. 1).

Two coveys used the gullied area east of field 3. One, a bevy of nine, established its headquarters in this area early in the fall and remained throughout the winter without loss. The second covey, consisting of 15 birds, left an adjoining farm and settled in the south end of these gullies when heavy snows came. The six birds in the flock at the south tip of field 4 obtained a large part of their food in the gullied area just south of this field and used also the field-border strip along the north side of field 1. The coveys on the west side of field 6 and in the northwest corner of field 14 each contained four birds. A bevy of 20 birds, with headquarters

on the northeast corner of field 12, ranged in a field on the adjoining farm.

A census taken before any operations were begun showed 3 coveys with 10 birds each. Three new coveys containing a total of 23 birds appeared after operations, and 1 of the old coveys increased to 20 birds. One of the two remaining old coveys lost one bird and the other four. The total increase was, therefore, 28 birds.

In addition to these 6 coveys, 2 groups of approximately 15 birds each were found on this farm during the period when snow covered the ground. One of these coveys was found in the food patch south of fields 9 and 10 and the other along the eastern border of field 7. It is not known definitely whether these flocks were residents on the farm or whether they had come in during the snowstorms because of the better food supply.

This farm could be made to accommodate two or three more coveys than are shown on the map. The woodland west of field 11 should make satisfactory headquarters for a covey. Before the soil-conservation operations were begun there was not sufficient ground cover in this area. Suitable cover now is provided by protection of terrace outlets on the east side of field 11 with such shrubs as common hedge privet, coralberry, and Scotch broom. Field 8 also might support a covey, although the farm map shows that this field does not now make a satisfactory contribution to wildlife production. It could be improved by a hedgerow along its western boundary.

In addition to the quail, a number of squirrels and from 12 to 18 cottontail rabbits live on the farm. While the area does not afford adequate range for wild turkeys, nearly every year a small flock of turkeys ranges through the fields and woodlands of the southern part of the farm. Special plantings made for turkeys in fields 1 and 2 help to hold the birds in this general vicinity.

Soil conservation is essentially a matter of the wise use of land. The wildlife crop on this one farm demonstrates a worth-while use for noncultivable or untilled eroding areas.

SHRUBS FOR EROSION CONTROL AND WILDLIFE USE

The value of shrubs for erosion control and wildlife use has not been fully appreciated. Some plants usually regarded as undesirable actually render important service in furnishing food and cover for wildlife and in controlling erosion. As an example, the wild plum, which springs up freely in many places, frequently holds soil that otherwise would be lost, and it provides excellent food and cover for many birds and mammals. It is often possible to obtain enough shrubs to plant eroded areas by gathering them from the farm itself. Instructions for transplanting wild shrubs are given on page 22.

SELECTION OF SPECIES

Care should be taken to avoid the use of certain plants in locations where they might become serious agricultural pests. Species objectionable in one part of the farm, however, often may be used safely in others. Pasture and Cherokee roses, Himalayan blackberries, and Scotch broom, for example, can be used in woodland gullies and other

out-of-the-way places without danger of spreading to areas where they might be harmful.

Woody plants recommended for use in connection with wildlife management may be classed in three groups:

(1) Hardy plants, which survive in very unfavorable locations. Plants in this group are most successfully used for shrub check dams in gullies and at terrace outlets and for planting on very severely eroded field borders and the like.

(2) Plants not quite so vigorous, which should be used on somewhat more favorable sites. Plants of this group can be used to advantage at the outlets of gullies where there is a silt deposit, on the better soils around field borders, and along ditchbanks. They contribute a variety of foods, which makes them highly desirable in wildlife habitats.

(3) Species that can be planted singly, here and there, in other field plantings. These plants are valuable mostly for establishing vegetation on land retired from cultivation and for adding variety. They should be planted singly, not in trenches.

Fruits and seeds of some of the species listed, while not especially sought by wildlife, may be eaten during emergencies. These species are purposely included in the erosion-control planting stock and should be distributed widely over each farm so that during "pinch" periods, when snow and sleet cover the ground, or during early spring, when more palatable foods are scarce, a food supply of a sort will be available.

GROUP 1.—To be used on very unfavorable sites

Amur privet (<i>Ligustrum amurense</i>).	Sassafras (<i>Sassafras variifolium</i>).
Chickasaw plum (<i>Prunus angustifolia</i>).	Shrubby lespedeza (<i>Lespedeza bicolor</i> and <i>cyrtobotrya</i>).
Chinese privet (<i>Ligustrum sinense</i>).	Wild blackberries (<i>Rubus</i> spp.).
Coralberry (<i>Symphoricarpos orbiculatus</i>).	Wild plum (<i>Prunus americana</i>).
Himalaya blackberry (<i>Rubus procerrus</i>).	Wild roses (<i>Rosa</i> spp.).

GROUP 2.—To be used on more favorable sites

Black cherry (<i>Prunus serotina</i>).	Hawthorn (<i>Crataegus</i> spp.).
Blackhaw (<i>Viburnum prunifolium</i>).	Indigobush (<i>Amorpha fruticosa</i>).
Chokecherry (<i>Prunus virginiana</i>).	Jersey-tea (<i>Ceanothus americanus</i>).
Dwarf sumac (<i>Rhus copallina</i>).	Redbud (<i>Cercis canadensis</i>).
Elder (<i>Sambucus canadensis</i>).	Red cedar (<i>Juniperus virginiana</i>).
French mulberry (<i>Callicarpa americana</i>).	Smooth sumac (<i>Rhus glabra</i>).
Hackberry (<i>Celtis occidentalis</i> and <i>georgiana</i>).	Staghorn sumac (<i>Rhus typhina</i>).

GROUP 3.—To be planted singly among other plantings

Allegheny serviceberry (<i>Amelanchier laevis</i>).	Creeping serviceberry (<i>Amelanchier stolonifera</i>).
American holly (<i>Ilex opaca</i>).	Downy serviceberry (<i>Amelanchier canadensis</i>).
Black oak (<i>Quercus velutina</i>).	Dwarf chinquapin oak (<i>Quercus prinoides</i>).
Blueleaf grape (<i>Vitis bicolor</i>).	Everbearing mulberry (<i>Morus rubra</i> var.).
Carolina moonseed (<i>Occultus carolinus</i>).	Flowering dogwood (<i>Cornus florida</i>).
Chinquapin oak (<i>Quercus muhlenbergii</i>).	

GROUP 3.—To be planted singly among other plantings—Continued

Frost grape (<i>Vitis cordifolia</i>).	Silky dogwood (<i>Cornus amomum</i>).
Inkberry (<i>Ilex glabra</i>).	Smooth withe rod (<i>Viburnum nudum</i>).
Laurel oak (<i>Quercus laurifolia</i>).	Southern blackhaw (<i>Viburnum rufidulum</i>).
Muscadine grape (<i>Vitis rotundifolia</i>).	Sparkleberry (<i>Vaccinium arboreum</i>).
Nannyberry (<i>Viburnum lentago</i>).	Thicket serviceberry (<i>Amelanchier oblongifolia</i>).
Peppervine (<i>Cissus arborea</i>).	Virginia creeper (<i>Parthenocissus quinquefolia</i>).
Persimmon (<i>Diospyros virginiana</i>).	Wild apple (<i>Malus pumila</i>).
Pigeon grape (<i>Vitis aestivalis</i>).	Willow oak (<i>Quercus phellos</i>).
Possumhaw (<i>Ilex decidua</i>).	
Roughleaf dogwood (<i>Cornus asperifolia</i>).	
Shingle oak (<i>Quercus imbricaria</i>).	

THE TRANSPLANTING OF WILD WOODY PLANTS

Young plants, even 1-year-old seedlings, make the best material for transplanting. Handling of very large plants, no matter how healthy and vigorous, should never be attempted unless they are moved carefully with large balls of earth. In erosion-control and wildlife work, time ordinarily does not permit this. Shrubs taken from moist, shady places will usually fail on dry, sunny spots. Plants should be taken from a place as nearly as possible like the one in which they are to be set out, and if possible from areas that for various reasons are little used by wildlife.

When wild stock is transplanted the roots should never be permitted to dry. They should be dug with as much earth as possible when the soil is moist, never when it is dry or baked. If it is impossible to get some soil with the roots, the plants can conveniently be kept in a bucket of water until the new site is prepared.

Transplanting may best be done on cloudy days in early spring, although plants can be handled with success at almost any time during the winter. The plants are dug with a spade or shovel, never with a fork, and are laid carefully on a piece of burlap. When enough have been placed on the sacking, the burlap is wrapped tightly around them and pinned with a nail or tied with cord. Shaking and rough handling should always be avoided.

If several days intervene between digging and planting, the plants should be heeled in. This is easily done by digging a shallow trench, placing the roots in it, watering them well, and covering them with the soil dug from the trench.

Before the plant is finally placed in the ground, the top should be cut off so that the height of the plant above the ground about equals the depth of the roots. This makes for sturdier plants and less wilting.

When a plant is placed in the ground the hole should be dug deeper than the root system will reach. Topsoil should be put in the bottom of the hole as the plant is set and should be tamped around the plant as the hole is filled. If all the soil is placed in the hole before it is tamped, the top layer is likely to be packed tightly around the stem, but the soil around the roots will be loose, and they may dry out and die.

Fertilizing and watering the plants as they are set, and watering during subsequent dry periods, will further ensure a vigorous growth and may be advisable where especially quick results are desired. Livestock should always be kept away from plantings.

SEED-PRODUCING ANNUALS AND PERENNIALS

In plantings to be utilized by wildlife the dense stands commonly desired for general crops are not necessary. Too dense a growth tends to develop less sturdy stems and is more inclined to lodge and form a compact mat near the ground. It also is more subject to decay and mold, which render food of little or no value.

The rate of seeding plants for soil and wildlife conservation varies somewhat with the uses intended. Since dense stands are necessary to prevent washing, large applications of seed usually are recommended for planting gullies, where conditions of soil and slope are adverse. Table 1 gives the rate of seeding per acre and approximate seeding dates for the most useful species and mixtures.

TABLE 1.—Seeding dates and rates of seeding for plants and mixtures of plants effective in soil conservation and preservation of wildlife

MIXTURES FOR PLANTING GULLIES

Species	Seeding dates	Pounds per acre	Species	Seeding dates	Pounds per acre
Sudan grass.....	{ May 1 to June 30.	{ 20	Korean lespedeza.....	{ Feb. 1 to May 31.	{ 20
<i>Lespedeza sericea</i>		{ 10	<i>Lespedeza sericea</i>		{ 15
Korean lespedeza.....		{ 10			
Total.....		40	Total.....		35
Sudan grass.....	{ May 1 to July 31.	{ 25			
<i>Lespedeza sericea</i>		{ 15			
Total.....		40			

MIXTURES FOR PLANTING FOOD PATCHES

Laredo soybeans.....	{ May 1 to July 15.	{ 15	German millet.....	{ May 1 to June 30.	{ 10
Browntop millet.....		{ 10	Shallu (Egyptian wheat).....		{ 15
<i>Lespedeza sericea</i>		{ 15	<i>Lespedeza sericea</i>		{ 10
Total.....		40	Total.....		35
Korean lespedeza.....	{ Feb. 15 to May 15.	{ 20	Browntop millet.....	{ Apr. 1 to May 31.	{ 15
Common lespedeza.....		{ 20	<i>Lespedeza sericea</i>		{ 10
Total.....		40	Shallu (Egyptian wheat).....		{ 15
Iron cowpeas or Laredo soybeans.....	{ June 1 to July 15.	{ 20	Total.....		40
Browntop millet.....		{ 15			
Total.....		35			

SEED-PRODUCING PLANTS FOR PLANTING RETIRED AREAS

Austrian Winter peas.....	Sept. 1 to Nov. 30.	50	Millet:		
Sesame (Bene).....	May 1 to June 30.	30	Browntop.....	Mar. 1 to July 31.	25
Cowpeas:			German.....	.....do.....	25
Brabham.....	May 1 to July 31.	50	Pearl.....	.....do.....	30
Iron.....	.....do.....	50	Proso.....	.....do.....	25
Shallu (Egyptian wheat).....	Apr. 1 to June 30.	30	Red Amber cane.....	Apr. 15 to June 15.	30
Florida beggarweed.....	Apr. 1 to May 31.	20	Rye.....	Sept. 1 to Nov. 30.	50
Laredo soybeans.....	May 1 to July 15.	30	Sesbania.....	Apr. 1 to May 15.	15
Lespedeza:			Vetch.....	Sept. 1 to Nov. 30.	10
Common.....	Feb. 15 to Apr. 30.	20	Wheat.....	.....do.....	60
Korean.....	.....do.....	25			
Sericea.....	Mar. 1 to July 31.	20			

Comparatively little is known about suitable plants for wildlife that can be sown in the fall. Wheat, oats, rye, vetch, and Austrian Winter peas have been used with varying degrees of success. The planting of these species on fairly poor sites generally results in a stand satisfactory for wildlife. When gullied and galled sites are planted, they should be heavily mulched.

Korean lespedeza sown on very poor sites may develop into a fairly dense stand of plants, which, though only 3 or 4 inches high, may mature an abundance of seed. Such a stand is desirable for wildlife, although as an agricultural crop it might be considered a failure.

More detailed information relative to time of sowing, seedbed preparation, and suitable varieties for local conditions may be obtained from county agents and other local representatives of agricultural agencies.

SPORTSMANSHIP ON FARM FIELDS

Every land-use program must take into account not only the adaptability of the land to a particular use, but also the market for the product of the land. The farmer who through erosion-control activities turns his gullies, old roadways, hedgerows, field borders, and steep hillsides to the production of cover, food patches, and runways for game very likely will develop a wildlife crop in excess of his own requirements. He may wish to enter into some agreement with hunters who are eager to harvest the crop. Although the crop belongs to the State, the farmer controls the harvest through his ownership of the land. He can close his gates to hunters, but it may be decidedly to his advantage to permit hunting on his farm in return for either a cash fee or some other remuneration.

Farmers know that it is impossible to produce a permanent game crop if hunters come in to kill ruthlessly down to the last rabbit or the last bird in a covey. The farmers know that they supply food and cover to no purpose if sufficient breeding stock is not left to replenish the coverts in succeeding seasons. Hunters who break down gates and fences, kill chickens and turkeys, trample out crops, and in other ways destroy property create a prejudice against genuine sportsmen who respect the rights of landowners. Farmers rightfully refuse to tolerate gunners who destroy property. Sportsmen interested in perpetuating wildlife on farms should join with farmers in demanding regulated hunting.

Farmers who do not permit hunting on their land also are cooperators in wildlife production and friends of sportsmen. The scattered farms on which hunting is not permitted act as reservoirs for breeding stock, which will spread out each spring and replenish other areas. For small upland game a large number of these scattered refuge areas are more effective than a few large refuges. Quail, as well as some other small forms of wildlife, ordinarily do not travel any great distance. While a large reserve would supply breeding stock for a relatively small surrounding area, the same amount of land scattered in small blocks serves a much larger hunting range.

The interests of hunters of small game and of those who prefer the chase are not necessarily conflicting, as has sometimes been thought.

Farmers will find that some lands can produce for both. In large sections of the Southeast it should be possible to have, for example, good fox hunting without detriment to an abundant quail population. In fact, normal numbers of foxes and other predators reduce the mice, rats, and other animals that destroy food, cover, and eggs of ground-nesting species. These predators also remove diseased quail, rabbits, and other animals.

Farmers in the Southeast have indicated their desire to coordinate wildlife development with soil conservation. Not only conservationists and farmers but practically every citizen has an interest in wildlife resources. It is possible for nature lovers, sportsmen, and farmers to join in protecting these interests by encouraging the wise use of land and good sportsmanship in regulated hunting.

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